

2/PRTS

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**ACCESSORY FOR A SUDDEN AIR DISCHARGE DEVICE AND  
DISCHARGE DEVICE COMPRISING SAME**

5 The invention relates to an accessory for an air blast device.

It also relates to the air blast device equipped with this accessory.

For example, in order to eliminate areas of material build-up in cement kilns,  
it is known to use blast devices, also known as air-cannons.

The principle of these devices is to release a quantity of air suddenly so as to  
10 create a sort of blast which will remove the material build-up that accumulates during  
the manufacturing process.

The advantage of these devices consists in the fact that they can operate  
automatically and can be used in places that are not very accessible.

They also avoid the need for human intervention, which is a guarantee of  
15 safety.

Of course, these air cannons are also used in other fields.

Conventionally, such a device comprises a body housing a piston constituting  
a valve disposed between a tank and an outlet conduit.

When the valve moves out of its seat, the air trapped in the tank is suddenly  
20 discharged through the outlet conduit.

This outlet conduit may be longer or shorter, but generally, to avoid  
production problems and/or wear, this outlet conduit comprises a first part that is  
integral with the body of the blast device and a second part or accessory that is  
intended to extend the first part.

25 Since the blast device is located outside the kiln, this second part makes it  
possible to pass through the wall and open a longer or shorter distance away from the  
internal surface of said wall.

Conventionally, this second part or accessory, also called a nozzle, has a constant cross-sectional area along its longitudinal axis, though often the geometry of this cross-section is variable.

In fact, the geometric shape of the inlet of this accessory is circular, while the  
5 geometry of the outlet may be flattened in order to fit into the space of one or more refractory bricks.

The efficiency of these devices depends on the volume of the tank, the pressure in the latter, and the opening speed of the valve.

It is very important to deliver a quantity of energy in a short instant.

10 The effects produced by a blast are not comparable to the effect of a gas under pressure that feeds a nozzle continuously (DE-A-4128165 or DE-A-2035378).

In certain places, the volume of the tank is limited because of its size, and often the air feed pressure of these tanks is limited.

It is then necessary to increase the number of these devices, assuming there is  
15 enough space, which is not always the case.

The object of the invention is to provide a solution that makes it possible to improve the efficiency of these air blast devices.

To this end, the subject of the invention is an accessory that is intended to be mounted on the end of an outlet conduit of an air blast device, this accessory being in  
20 the form of a tube mounted coaxially to the axis of the outlet conduit, this accessory being characterized in that the cross-sectional area of this tube decreases in the direction in which the air is discharged, then increases, thus forming a convergent segment followed by a divergent segment.

The other subject of the invention is the air blast device equipped with the  
25 accessory according to the invention.

The invention will be clearly understood with the help of the following description given as a nonlimiting example in reference to the attached drawing, which schematically represents:

- Fig. 1: an air cannon with its accessory attached,
- 5        - Fig. 2: the accessory seen in axial cross-section.

Referring to the drawing, we see a device 1 for suddenly discharging air contained in a tank 2.

The blast device is mounted, for example, on a wall 9.

This blast device comprises a body 1A or housing, containing a valve 3 and its  
10        seat 3A, which valve, when it is moved out of its seat, allows the air contained in the tank to pass through an outlet conduit 4.

This short outlet conduit is extended by an accessory 5 in the form of a tube mounted coaxially to the axis of the outlet conduit 4.

This accessory is attached to the end of the outlet conduit by a fastening means  
15        10 such as a flange.

This accessory 5 is generally set inside a wall 9 that it passes through.

These air blast devices operate as follows:

First, the air coming from the feed proceeds to accumulate in the tank, which fills up.

20        When the tank has reached the required fill value, the feed of this tank is cut off, and the return motion of the valve is actuated, moving it out of its seat.

The air contained in the tank is suddenly discharged, releasing a substantial amount of energy in a brief instant, thus causing a blast, i.e., an impact force that can be measured by means of a force sensor.

According to the invention, the cross-sectional area of this tube decreases in the direction F in which the air is discharged, then increases, thus forming a convergent segment A followed by a divergent segment B.

It is clear that this increases efficiency.

5           In a first embodiment, the area E of the inlet of the accessory is equal to the area S of the outlet.

In a second embodiment, the area S of the outlet of the accessory is greater than this inlet area E.

10           The ratio between the cross-section D measured at the cross-sectional level having the smallest area and the inlet cross-section E is greater than or equal to  $1/5$ , but preferably greater than  $1/3$ .

The ratio between the cross-section D measured at the cross-sectional level having the smallest area and the outlet cross-section S is greater than or equal to  $1/5$ .

15           The distance between the position of the aforementioned cross-section D and the seat against which the valve rests is a maximum of one meter for a pressure of up to twelve bar.

Tests were performed with an air blast device having an inlet diameter E of 150 mm and with a 100-liter tank.

The force sensor was placed at the end of a tube that is 500 mm long.

20           It is clear that the results are better when the ratio  $D/E$  is between 0.6 and 0.8.

An increase in the impact force on the order of 50% is obtained.

This system minimizes the effects of vortexes, which reduce efficiency.